

Zero food miles super-circuit

S. S. Zubir, F. R. Razali, Q. Norhisham & Y. Rahman

*Department of Architecture, Faculty of Architecture,
Planning and Surveying, Universiti Teknologi MARA, Malaysia*

Abstract

The manifestation of this project starts with the idea of reclaiming undefined spaces around the Berlin S-bahn network. The potentials for intervention of urban spaces along the ring are enormous as they are well connected to the rest of the city. Demand for sustainable food is on a rapid rise in Germany, and organic food producers are unable to keep up with the increasing demand. In Berlin, food travels an approximate half of the city's length before it reaches the consumers, contributing greatly to thousands of food miles. This fact sparks a number of design notions of the possibility to plant food within the confinements of the city to supply the need of the urban populace and beyond. The chosen site for this proposal is between two stations, Westhafen and Beusselstrasse, strategically located along the river and Tegel airport further enables it to be an important transit and epicentre for future expansion that link the whole of the S-Bahn ring. The preference towards this type of food production is new and could be accepted as more Berliners opt for organic and locally-produced food. The mechanism of plot ownership leads back to the traditional allotment gardens owned by the city dwellers.

Keywords: urban agriculture, S-bahn ring, food miles, sustainable, organic food, public-park.

1 Introduction

In 2006, an architectural studio from Berlage Institute, under the supervision of Dietmar Leyk, suggested the potential of the Berlin Ring bahn as a Circuit of Knowledge. The projects form a basis to further this investigation of metropolitan Berlin and its relation with the circular trail-transit system. Again, in 2010, Dietmar Leyk led another studio from Berlage exploring the architectural and urban potentials of the knowledge circuit. Both urban projects



were related to the Ring bahn and Berlin's influential entity inspired the research to explore the notion of the 'knowledge circuit' in a different perspective. 20 architectural students from UiTM revisited the project site in July 2011 to generate alternative trajectory of meaningful association with the city of Berlin.

Using the established framework and resources from earlier works, the team has identified the potentials of the Ring bahn to be the distribution, production and recreation of knowledge. The Ring bahn is a 37km long circular rail system that was established in 1862 surrounding the inner city of Berlin. The ring has suffered major damages during World War II and has been reconnected with two continuous rail lines operating in both directions in 2006 [1].

2 Dilemmas and potentials

Demand for sustainable food is on a rapid rise in Germany, making it the country with the highest consumer of organic food in Europe (Fig. 1) [2]. The identified site for this research design intervention has an abundant amount of vacant space, giving it a huge potential to inject a new programme in the production of food without contributing to Food Miles.

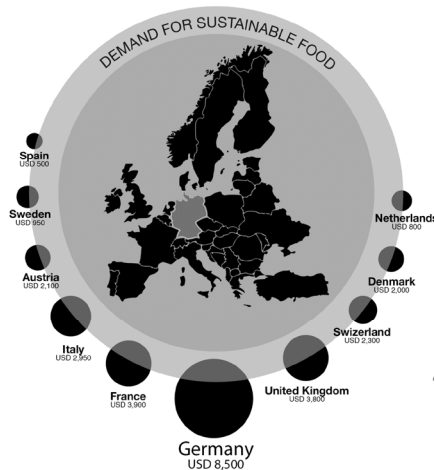


Figure 1: Comparison between European countries by amount of demand for organic food in trade value (in millions).

Food miles can be classified in two ways. First, it is the transportation within a country as a result of the huge distance-travelled between farmlands and the centralized urban population of cities. Second, it is the transportation between countries as nations import and export fresh and processed food products. The increase in their demand and supply is due to the globalization of trade [3].

Burnt fossil fuels are the major contributors of the food mile and responsible for not only local and global air pollution, climate change and destruction of the precious ozone layer. In addition, it conduces noise pollution, vibration, fumes

and dirt, accidents, wear and tear on transportation infrastructure and the destruction of wildlife habitats [4]. By introducing the zero food mile super-circuit, will eventually establish Berlin to be a more sustainable city.

Fig. 2 illustrates conventional food transportation methods into the city with most of its supply coming from farmland outside the borders of Berlin. The only way to prevent additional transportation costs would be to grow food nearer to the city. This concept of urban farming is not new. Due to limited amount of space in the city, urban farming is economically and environmentally possible within the confinement of high-rise buildings [5]. An illustration of food distribution via vertical farming has been mapped in Fig. 3. The next question would only suggest, what if food were to be cultivated around the S-bahn ring itself? This utopian idea could be transposed to other cities as most great metropolitan have their own circular line of transportation.

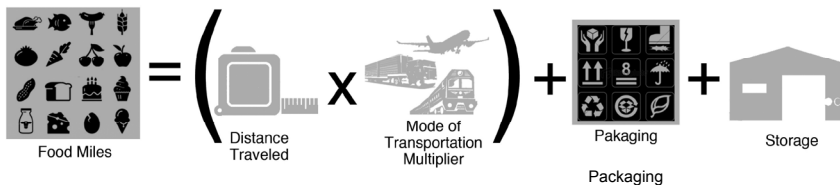


Figure 2: Basic estimation on how food mile is calculated.



Figure 3: Hypothetical solution simulations demonstrate the potential of S-bahn ring agricultural park to be the most efficient method to supply organic food to the city.

3 The site

The project is strategically sandwiched between two S-bahn stations, Westhafen and Beusselstrasse as illustrated in Fig. 4. There are six rail lines passing through Westhafen, the S41, S42, S45, S46, S47 and U9. Currently, the site is occupied by BEHALA, Berlin's largest logistic port operator. The site has an abundant amount of unused vacant space. Its strategic location along the river, Tegal



Figure 4: Site master plan illustrates farming plots, market silos and connecting pedestrian bridges linking both sides of the track.

Airport and the S-bahn itself, further enhances its potential to be an iconic landmark for Berlin in the near future.

4 Design hypothesis

Organic food producers are unable to meet the increasing demand. Westhafen encompasses the ability to be the starting point for organically grown food as space is abundant. Its strategic location on the S-bahn ring itself, eases the distribution of locally grown food to the rest of the city thus contributing to zero food miles. The possibility of future expansion by connecting all the vacant plots into organic farmlands will create a greenbelt on the S-bahn, making it the longest public park in the world (Figs. 5 and 6).



Figure 5: Projection mapping on the growth of the agricultural park over designated timeline.

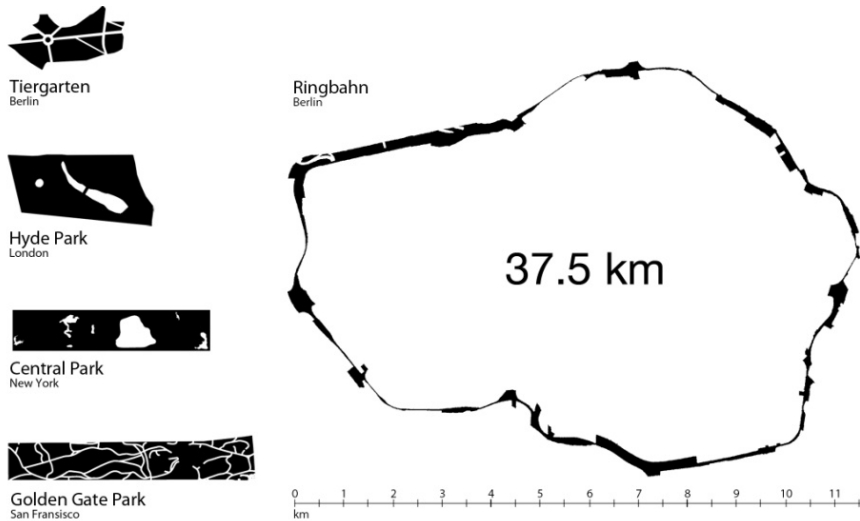


Figure 6: The comparison of famous public parks around the world with the new Berlin super-circuit park, which will be the longest to date.

5 Strategy

In order to guarantee success of this proposed intervention, a number of implementation mechanisms have been listed. The strategy includes using economical instruments, legal instruments, social instruments and infrastructure. These instruments pose vital necessity that contributes to the general success of the scheme. The key players from different field will play their role in the realisation of the project as shown in Fig. 7.

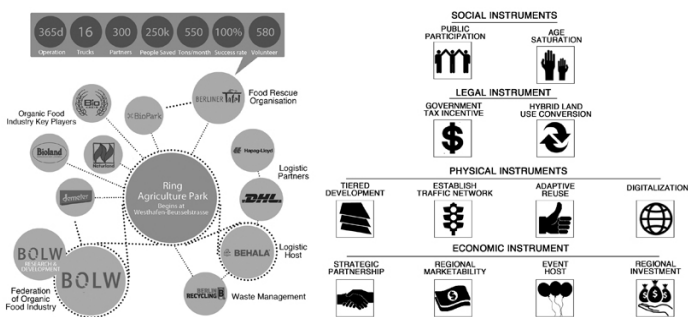


Figure 7: Strategic partnership diagram demonstrates the relation of different organic producers, logistic companies, a food rescue organization and an organic food association with summary of strategies that have been implemented under different instruments in order to ensure the success of the project.

According to the Federation of the Organic Food Industry (BÖLW), demands for organic food products are increasing rapidly and producers find it difficult to keep up with the supply. A recent increase of fast food restaurants and cafes 'going green' indicates their support towards healthier and sustainable food for everyone [6].

5.1 Social instruments

- 1 Public Participation-The project starts with public participation and movement to claim the S-bahn ring as a large public space. The public play an important role in forwarding the idea to the government in order to get approved.
- 2 Age Saturation-The proposed intervention will introduce a number of specific programs that can be enjoyed by both the younger and older generation as illustrated in Fig.8. The new public space will encourage interaction between them and create a better responsive community. The age saturation will be a catalyst of knowledge transfer through informal methods from the older to the younger generation.



Figure 8: A hypothetical view of the development along the port strip. Here, the activities that cater for both ages is illustrated. Leisure, recreational and farming activities are integrated into the whole agricultural park.

5.2 Legal instruments

- 1 Government Tax Incentive-The S-bahn ring will also be a new ground for the major organic food companies to invest in. The new urban agricultural land will be exempted from tax. The organic food producers in Germany will get tax incentive from the government to promote better food quality in production and distribution.

- 2 Hybrid Land Conversion-The government will have to use some of the legislative instruments to convert or merge land use of the existing S-bahn ring to a new hybrid land function. The new typology of land development must be part of the future urban projection plan of Berlin.

5.3 Physical instruments

- 1 Tiered Development-In order to cater for the large number of food demand, certain land areas are required to be converted into intensive production grounds. Tiered development will ensure multiplication of space to meet the spatial demand of the new agricultural park.
- 2 Establish Traffic Network-Existing traffic and linkage infrastructure will be re-established and restructured into an integrated system.
- 3 Adaptive Reuse-Conversion of condition, materials and structure on the site is important to make sure the environmental impact of development is kept low. This strategy can reduce the introduction of foreign or new materials on the site and maintain its *genius loci*.
- 4 Digitalization-Effective method of administration and systematic farming can significantly reduce errors and increase productivity. Reduction of planning time, crop cycle and harvest pattern due to digitalization ensures optimum use of intelligence resources.

5.4 Economic instruments

- 1 Strategic Partnership-One of the most important instrument will be the economical devices to fund, run and maintain the large public urban space. Strategic partnerships between the organic food producers, the institute of organic food, logistic companies and food charity organisation will execute this. The separate entities will work on a win-win situation by harnessing each business specialization. The food organic producer will be able to gain larger market share, reduce production and transportation cost by producing right in the city. The logistic partners will gain more business, as the food producer needs efficient distribution network. The Berliner Tafel, a food rescue organization will gain better food products and distribute it to the needy Berliners on its operation.
- 2 Regional Marketability-The food produced in the super-circuit might one day exceed the need of the Berlin metropolitan. In that case, the excess food can be easily transported out of Berlin in a sustainable manner as the rail system extends further into suburban districts due to the well-connected train network. The port itself can also serve Norwegian countries north of Germany through zero carbon emission transportation practices.
- 3 Host Event-The scale of the project allows numerous events to be held in certain parts of the development. Agricultural related conferences and expositions could be held alongside entertainment events such as open-air concerts and plays.



- 4 Regional Investment-The location of Berlin as the centre of Europe poses a great potential to tap regional investment into the city. The rapid growth of organic food business draws a large flow of investment into the city.

6 Program intervention

The existing program of a freight port in Westhafen was dedicated solely to the workings of a logistic hub. The potential of the vacant land and unused strip of water for a recreational space is explored in this project. Here, agricultural programs such as poultry, pig breeding, crops and hydroponic plants are zoned into certain part of the site merging them together with recreational programs.

The new master plan will be reinforced with supporting programs that include cafes, food markets, public squares, a research institute, commercial spaces, an auditorium and temporary dwellings. Some of the programs are juxtaposed on temporary or seasonal events. Every weekend, a flea market can be organised in the square while the recreational facilities can host mini communal sport events. Since the emphasis is still on the larger park as a whole, the distribution of pavement networks for jogging and cycling is wired all over the site. The division and zoning of each program is mapped out in Fig. 7.

6.1 Program distribution

Four industry warehouses host a number of supporting programs that contribute to the generation of knowledge towards organic food. One of the warehouses is converted into a greenhouse, where new technique of planting and new seed is genetically engineered. This warehouse will allow experiments and tests to be done all year round including winter. The large scale of these greenhouses also makes it possible for artificial pollination to happen. The second warehouse will house layers of poultry and livestock breeding facilities. Here they are tested and analysed for optimum diet composition and optimum living conditions to ensure they get the right formula to obtain a maximum yield.

The other two warehouses will house lecture halls, administration for the research institute, offices and laboratories alongside temporary dwellings for the scientists. These blocks are located further away from public access. The natural gradient of privacy of the site influences the location of each program that has been laid out (Fig. 9).

As the rail track still caters an existing urban fabric, the agricultural program will not replace the existing urban function but rather maximize the spatial leftover of the city. The agricultural park will redefine the land usage of the area surrounding the Ringbahn stations according to the site's native function. The 5 typologies of urban intersection merging with the agricultural program are defined. The typological land use by percentage can be referred to Fig. 10. Each train station node will contribute to the growth of knowledge for the whole ring. The rail track that connects each station will also be exploited to cater for growing ground. The agricultural plots will be either on the ground, covering unused rail track or elevated above the track.



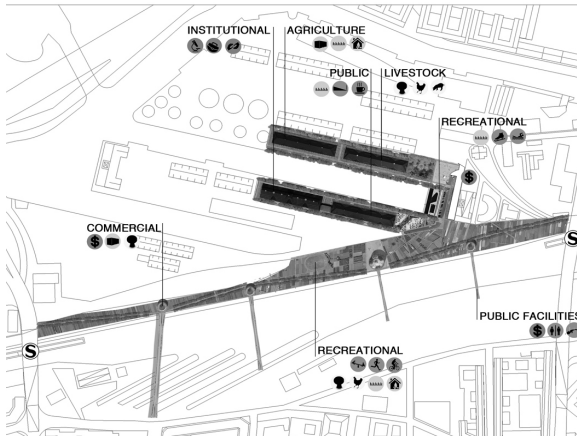


Figure 9: Site zoning and proposed programs distribution of the site.

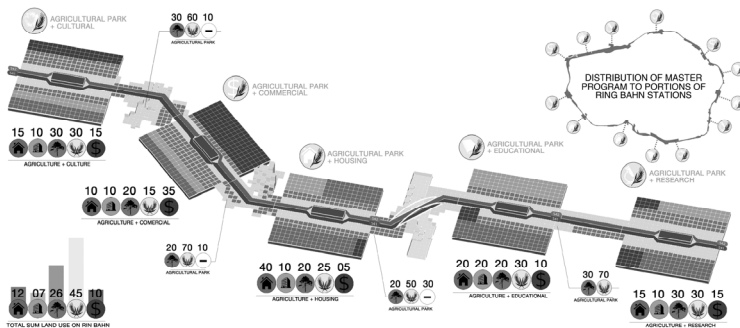


Figure 10: Distribution of hybrid land-uses along the S-bahn and its stations. The programs are distributed by percentage according to the site's native program.

The content of these new zoning areas around each station will be a new typology of hybrid urban block that merges with agricultural programs with other urban functions. The variation may grow in the future parallel with urban farming technological advancement (Fig. 11). The programs that will be merged will agricultural nature diverse from housing, commercial, institutional, research and recreational. These new nodes of urban clove will provide a well-connected urban and sustainable living environment as all the facilities are built in a 15 minutes walking radius. In addition of institutional or formal education of sustainability, the new living environment can educate or nurture knowledge on sustainable living.

6.2 Re-program

Existing buildings that are currently vacant or abandoned will also be taken into the conversion scheme. The solution for each structure is different, but as a general overview, the existing structure will be heavily utilized to help in the production of growing food vertically. The crops that need more sunlight will be place around



the building's perimeter façade, while plants that do not need too much sunlight will be grown within the darker inner section. Fig. 11 demonstrates the full capability or possibility of alteration that can help to provide extra farming ground.

The silos will be filled with supporting programs that will manage, maintain and market the crops produced on the agricultural plots. Since there are a significant number of Muslims in Berlin, one silo will house a Certified Body practising *Halal* food preparations. This is an emerging issue as the numbers of Muslims in Berlin continues to grow and *Halal* food products are not produced within the confinements of the city.

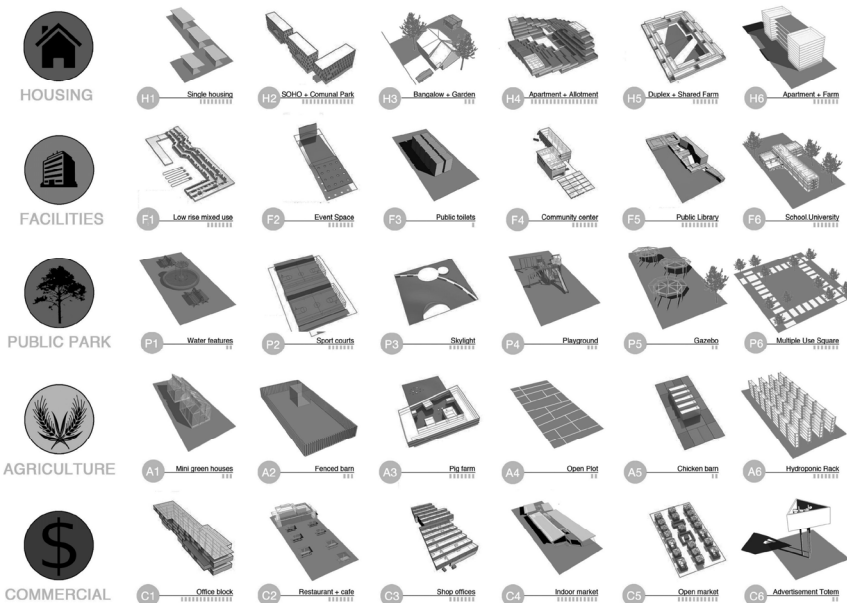


Figure 11: Illustrates the program typologies based on the 5 main land-uses that will be proposed around the S-bahn and its stations.

7 Conclusion

As a result, not only does this urban intervention helps to enhance a sustainable living, but also provides a massive green recreational belt around the city making it the largest public park in the world. The move to introduce organic farming in the city might save the existing urban structure by ensuring a constant and reliable source of food through the green super-circuit around the city. It is also a good improvement to the city of Berlin to reinterpret open, unused or vacant space to be dedicated to the process of producing food. The tracks of the rail and its station spatial content has also been maximised by the juxtaposition of new program layers (Fig. 12). The move justifies the reclaiming effort of the rail as a public realm as shown in Fig. 13. The new green belt will cater the need for open spaces and distribute knowledge about a sustainable lifestyle.

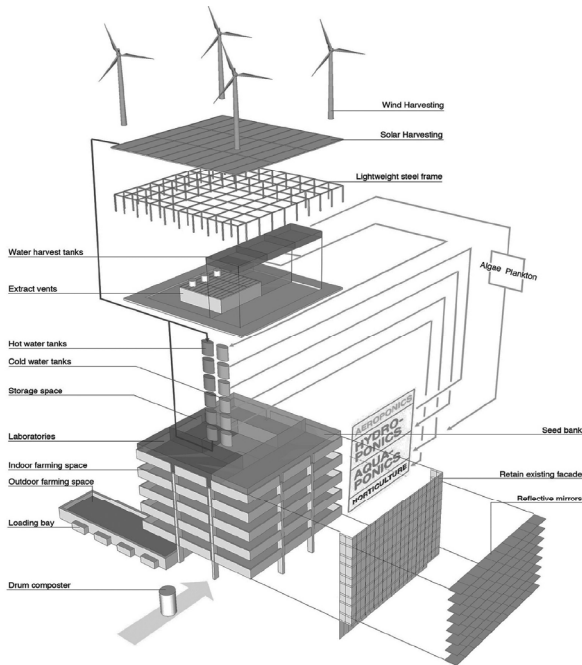


Figure 12: Illustration on solutions to convert unused structures that may exist in the area of the S-bahn tracks or its stations for farming purposes.

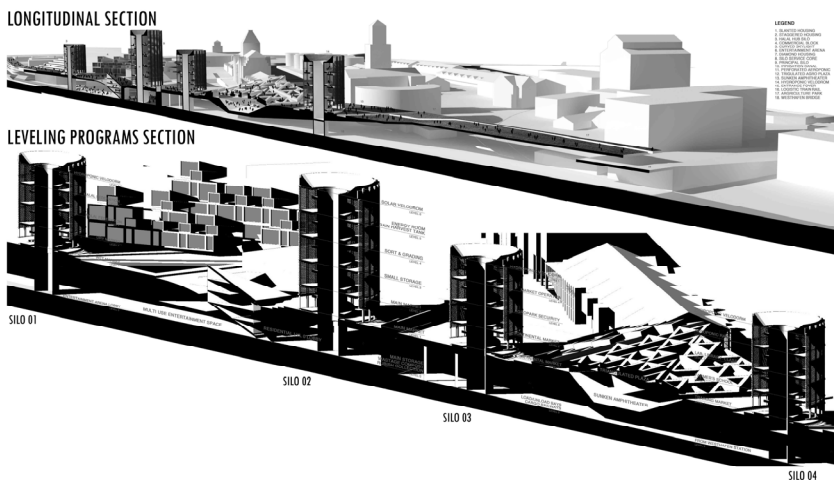


Figure 13: Longitudinal section illustrates the relation of the existing site with the new intervention. Note that the designated program influences the new artificial topography of the new agricultural park platform. Detailed section cut through the silos reveal specific program injected on each level.

References

- [1] Leyk, D., *Working and Living in the City of Knowledge*, Steelcase WorkSpace Futures, France, 2010.
- [2] Pinckaers, M. & Benz, K. & Brans, H., *EU-27 Organic Products Market Report*, USDA Foreign Agriculture Service, 2010.
- [3] Paxton, A., Food Miles. In Viljoen, A. (Ed.), *CPULs Continuous Productive Urban Landscapes*, Elsevier Architectural Press, Great Britain, pp. 40-47, 2005.
- [4] Rahman, Y., *Possibilities of Implementing Vertical Farming in Malaysia Based on Environmental Degradation and Rapid Urbanization*, unpublished research paper, UiTM, 2011.
- [5] Despommier D.D. & Ellingsen E.C., *The Vertical Farm-The origin of a 21st century Architectural Typology*, CTBUH Journal, Issue No. 3, pp. 26-34, 2009.
- [6] Gerber A. *BÖLW-Federation of the Organic Food Industry Association* Imprint; 2002-2005 available on <http://www.boelw.de/impressum.html>, retrieved 17 July 2011.

